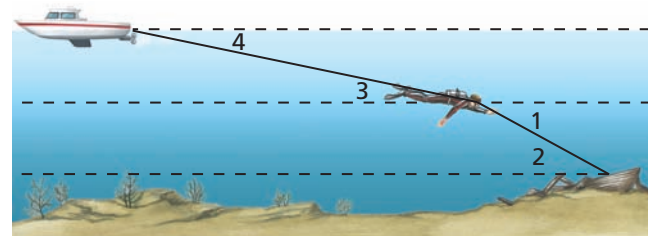


**LESSON**  
**8-4**

## ***Angles of Elevation and Depression***

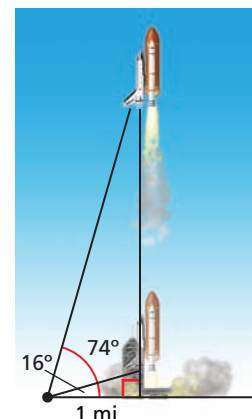
1. Is  $\angle 1$  an angle of elevation or depression? Explain your answer.



2. Geology To measure the height of a rock formation, a surveyor places her transit 100 m from its base and focuses the transit on the top of the formation. The angle of elevation is  $67^\circ$ . The transit is 1.5 m above the ground. What is the height of the rock formation? Round to the nearest meter.
3. Forestry A forest ranger in a 120 ft observation tower sees a fire. The angle of depression to the fire is  $3.5^\circ$ . What is the horizontal distance between the tower and the fire? Round to the nearest foot.



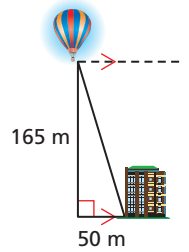
4. Space Shuttle Marion is observing the launch of a space shuttle from the command center. When she first sees the shuttle, the angle of elevation to it is  $16^\circ$ . Later, the angle of elevation is  $74^\circ$ . If the command center is 1 mi from the launch pad, how far did the shuttle travel while Marion was watching? Round to the nearest tenth of a mile.



**Tell whether each statement is true or false. If false, explain why.**


5. \_\_\_\_\_ As you watch a plane fly above you, the angle of elevation to the plane gets closer to  $0^\circ$  as the plane approaches the point directly overhead.
  
6. \_\_\_\_\_ An angle of depression can never be more than  $90^\circ$ .
  
7. Critical Thinking Describe a situation in which the angle of depression to an object is decreasing.

8. An observer in a hot-air balloon sights a building that is 50 m from the balloon's launch point. The balloon has risen 165 m. What is the angle of depression from the balloon to the building? Round to the nearest degree.



9. **Multi-Step** A surveyor finds that the angle of elevation to the top of a 1000 ft tower is  $67^\circ$ .

- To the nearest foot, how far is the surveyor from the base of the tower?
- How far back would the surveyor have to move so that the angle of elevation to the top of the tower is  $55^\circ$ ? Round to the nearest foot.

 **10. Write About It** Two students are using shadows to calculate the height of a pole. One says that it will be easier if they wait until the angle of elevation to the sun is exactly  $45^\circ$ . Explain why the student made this suggestion.

circular reasoning  
works because

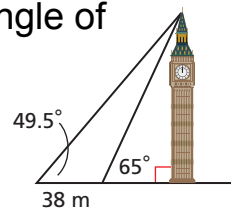


**11. The pilot of a rescue helicopter is flying over the ocean at an altitude of 1250 ft. The pilot sees a life raft at an angle of depression of  $31^\circ$ .**

**a.** What is the horizontal distance from the helicopter to the life raft, rounded to the nearest foot?

**b.** The helicopter travels at 150 ft/s. To the nearest second, how long will it take until the helicopter is directly over the raft?

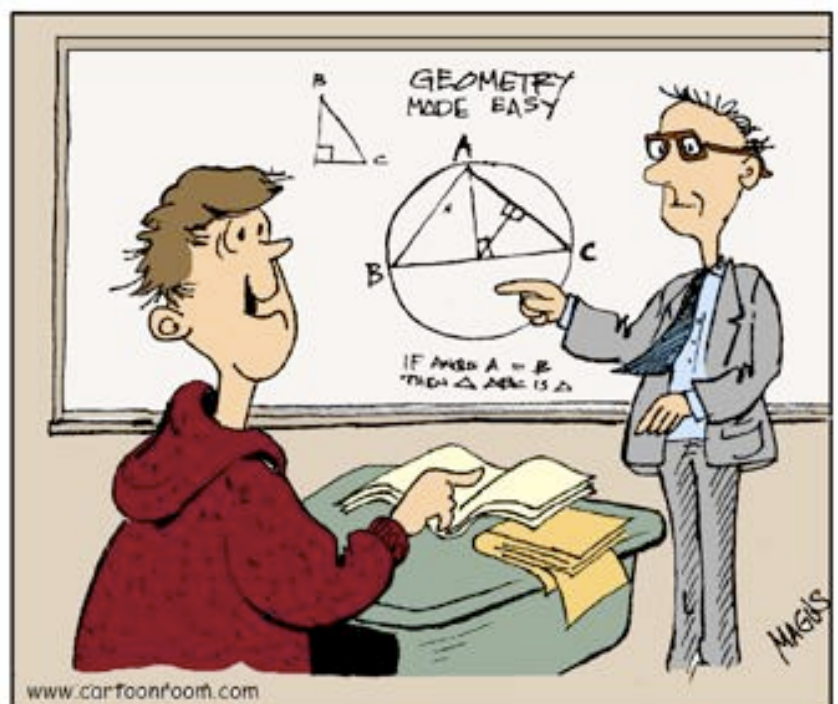
**12. Susan and Jorge stand 38 m apart. From Susan's position, the angle of elevation to the top of Big Ben is  $65^\circ$ . From Jorge's position, the angle of elevation to the top of Big Ben is  $49.5^\circ$ . To the nearest meter, how tall is Big Ben?**



"WE DID THE WHOLE ROOM OVER  
IN FRACTALS."

**13.** A plane is flying at a constant altitude of 14,000 ft and a constant speed of 500 mi/h. The angle of depression from the plane to a lake is  $6^\circ$ . To the nearest minute, how much time will pass before the plane is directly over the lake?

**14.** A skyscraper stands between two school buildings. The two schools are 10 mi apart. From school A, the angle of elevation to the top of the skyscraper is  $5^\circ$ . From school B, the angle of elevation is  $2^\circ$ . What is the height of the skyscraper to the nearest foot?



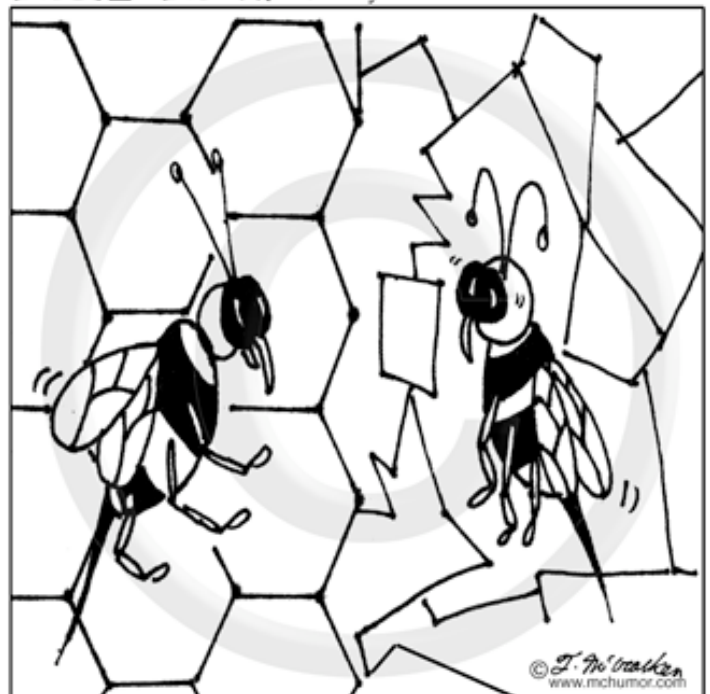
My brain is like a full computer disk... I'll have to forget something before I can learn your stuff.



15. Katie and Kim are attending a theater performance. Katie's seat is at floor level. She looks down at an angle of  $18^\circ$  to see the orchestra pit. Kim's seat is in the balcony directly above Katie. Kim looks down at an angle of  $42^\circ$  to see the pit. The horizontal distance from Katie's seat to the pit is 46 ft. What is the vertical distance between Katie's seat and Kim's seat?

Round to the nearest inch.

**McHUMOR.com** by T. McCracken



"That's what you get for skipping geometry class."